

REMARKS

The Examiner first addressed the Applicant's "election of styrene butadiene rubber, thiazole based materials for accelerators, difunctional cross-linkers wherein R is R"XR" and wherein R' is branched and linear C₁ to C₁₀ alkyls and wherein R" is the branched and linear C₂ to C₁₀ alkynes and wherein X is oxygen and wherein m = 1 in Paper No. 4. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP §818.03(a)."

With respect to the Examiner's restriction requirement, the Applicants object to it as improper in both form and substance. MPEP § 808 provides that "[e]very requirement to restrict has two aspects: (A) the reasons (as distinguished from the mere statement of conclusion) why the inventions as claimed are either independent or distinct; and (B) the reasons for insisting upon restriction therebetween as set forth in the following sections." (bold emphasis added). The Examiner has met neither of these burdens. In the Office Action of December 23, 2002, the Examiner merely instructed Applicant to elect a "single rubber" from claim 1, a "single accelerator" from claim 5, and a "single difunctional cross-linking agent" by selecting a single choice for R and for R' and for R" and for X from claim 1 and a single choice for m and n. No reasons were provided as to why the inventions as claimed are either independent or distinct, nor were reasons from MPEP 808.01, *et. seq.*, enumerated which could properly support such a restriction requirement. The restriction requirement in the Action of December 23, 2002 could not be reasonably seen as requiring that the applicant "distinctly and specifically point out the supposed errors in the restriction requirement." MPEP § 818.03(a). This is because the Examiner gave no reasons with which to argue. The Examiner made the bare statement, essentially an instruction, requiring that the Applicants elect a single rubber, a single accelerator, and a single difunctional cross-linking agent.

Since the Examiner did not comply with the burden placed on him to state reasons for the restriction requirement, the Applicants could not have been expected to provide a substantive response. Nevertheless, in their response filed January 29, 2003, the Applicants did in fact, traverse the restriction requirement as well as provide provisional elections as required

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in MPEP § 809.02. Despite the foregoing, the Examiner concludes that since “applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse [under MPEP § 818.03(a)].” Despite the Applicants’ belief that the restriction requirement was adequately addressed and overcome in their response of January 23, 2003, the Applicants will restate and augment their position here.

It is improper for an Examiner to refuse to examine that which the Applicants regard as their invention, unless the subject matter in a claim lacks unity of invention. *Ex parte Hozumi*, 3 USPQ2d 1059 (Bd. Pat. App. & Int. 1984); *In re Harnish*, 631 F.2d 716, 206 USPQ 300, 305 (C.C.P.A. 1980); MPEP § 803.02. Broadly, unity of invention exists where compounds included within a Markush group (1) share a common utility, and (2) share a substantial structural feature disclosed as being essential to that utility. MPEP § 803.02. Unity of invention is lacking where “the claims are drawn to a collection of unrelated inventions.” *Hozumi*, 3 USPQ2d at 1060. A Markush claim is merely a recitation by enumeration, absent a satisfactory generic term to describe the elements enumerated. More plainly, a Markush grouping must have some unifying feature, such as a common function or homologous structure. A Markush group may be constructed by enumerating specific examples, but not all such examples, from a classification that might already have a sufficient generic term.

In the instant application, the generic terms “elastomer,” “rubber,” or “vulcanizable rubber” would suffice in place of the enumeration of the 14 rubbers in claim 1 as it now stands. However, in the interest of avoiding an indefiniteness rejection under 35 U.S.C. § 112, second paragraph, the Applicants felt it prudent to enumerate the elastomers as given. Thus a balance between an exhaustive listing and a generic term such as “rubber” is struck. A Markush-type claim can include independent and distinct inventions, where two or more of the members are so unrelated and diverse that a prior art reference anticipating the claim with respect to one of the members would not render the claim obvious under 35 U.S.C. § 103 with respect to the other member(s). MPEP § 803.02. No reasonable person skilled in the art could reach such a conclusion. All of the elements listed in claim 1, lines 5-9 are rubbers, as stated by the

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Examiner. (Office Action December 23, 2003). Further, no specific rubber is disclosed or claimed as being critical to the invention and hence the rubber chosen is not the point of novelty for this invention.

The Applicants note that they could have recited a vulcanizable rubber, *per se*, in claim 1 and not recited a Markush group. Claim 1 of Yatsuyanagi et al, of record, merely calls for a vulcanizable rubber, a reinforcing filler and a sulfur compound, such rubbers being disclosed in their specification at column 12, lines 52-58. Accordingly, the restriction of “rubbers” to SBR or any specific species is traversed. The restriction to a single difunctional agent and a single accelerator is not traversed.

The Examiner has objected to the Preliminary Amendment filed January 29, 2003 under 35 U.S.C. § 132 as adding new matter. Specifically, the Examiner objects to the inclusion of the term “thiazole” in the written description enumerating classes of accelerators, and similarly has rejected the amendment of claims 5, 9, 14, and 19 under 35 U.S.C. § 112 for including that generic term. The Applicant traverses the new matter objection and rejection. A claim reciting a thiazole as an accelerator in the instant application is proper, as the generic term is supported by the disclosure of CBS accelerator (*N*-cyclohexyl-2-benzothiazole sulfenamide) and MBTS accelerator (benzothiazyl disulfide), both of which are thiazoles. The disclosure of specific examples in the written description of a patent application is sufficient to support a generic claim when the use of the broader class would “naturally occur to one skilled in the art reading the description.” *In re Smythe*, 480 F.2d 1376, 178 USPQ 279 (C.C.P.A. 1973). It is well settled that a disclosure must be interpreted through the eyes of one skilled in the art. “The principle goes hand in hand with the proposition that questions of adequate support under the first paragraph of 35 U.S.C. § 112 are not resolved by ascertaining whether claim language finds literal support in the original disclosure, but by determining whether the ‘concept’ embraced by the claim language is present in the original disclosure.” *Ex parte Cure*, 215 USPQ 567 (P.T.O. Bd. App. 1982).

The use of the generic term “thiazoles,” supported by the cases cited hereinabove as well as the disclosure of CBS and MBTS in the written description, is the alternative to that

which the Examiner proposes. “The alternative places upon patent applicants... the undue burden of listing... descriptions of the very many structural or functional equivalents of disclosed elements... which are already stored in the minds of those skilled in the art, ready for instant recall upon reading the descriptions of specific elements or steps.” *Smythe*, 178 USPQ at 285. In the words of Judge Rich, “[w]e are not saying that the disclosure of [‘CBS’ or ‘MBTS’] *by itself* is a description of the use of all of the [‘thiazoles.’] Rather, it is the descriptions of the *properties and functions* of the [‘CBS’ or ‘MBTS’ as an accelerator] described in [Applicant’s] specification which would suggest to a person skilled in the art that [Applicant’s] invention includes the use of [“thiazoles”] broadly.” *Id.* (emphasis in original).

Clearly, one skilled in the art of crosslinked elastomers, looking at the entirety of the instant application, including references to CBS and MBTS, which are thiazoles used as accelerators, would find that “concept embraced in the language in claims 5, 9, 14, and 19, reciting accelerators. The term “thiazoles” would “naturally occur to one skilled in the art reading the description.” In view of the foregoing explanation, the Applicants respectfully request the Examiner to reconsider and withdraw the objections to incorporation of the term “thiazoles” in the specification and the rejection of claims 5, 9, 14 and 19 for its recitation therein.

Claims 1-20 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicants regard as the invention. In support of this rejection, the Examiner asserts that the term “molecular weight”, where unqualified as to the type of molecular weight, for instance weight or number average molecular weight is unclear since molecular weights can vary drastically depending on the type of distribution intended.

The Applicants respectfully disagree. At page 10 of the specification, the Applicants disclosed the molecular weight range of about 1000 to about 8000 g/mol, a well known expression for number average molecular weight. With reference to page 6 of the specification 28, note the phrase “ M_n may be approximately 10,000 g/mol on average for example”.

The Examiner has also stated that it is unclear what the structure of the difunctional cross-linking agent embraces when $m = 0$ given that sulfur is divalent and would be linked only to a single group R in cases where no Y group was present. The answer to that question, where m is 0, is that the agent is embodied in the structure $(SRS)_n$, where the two sulfurs are attached to each other within the ring. In such instance, the R group is comprised of a C4 to C20 alkylene group or R"XR", as set forth in the specification and claims. It should be apparent that the R group must be selected carefully from the groups disclosed, so that the sulfurs are not linked to a single R group, where $m=0$.

Next, the Examiner has rejected claims 1-14 under 35 U.S.C. §102(e) as being anticipated by Yatsuyanagi et al. (USP 6,518,367). In support of this rejection the Examiner asserts that

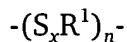
Yatsuyanagi et al. disclose a vulcanizable rubber containing composition containing a polysulfide and an accelerator such as a thiazole (Abstract).

Note Table II and column 21 lines 13-16 for use of applicants' polysulfides such as polysulfide No. 4 which is a benzyl terminated Thiokol LP-31.

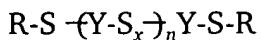
Note that the applicants' specification discloses the use of Thiokol LP-31 and the patent discloses the use of benzyl terminated Thiokol LP-31 (as is embraced by alkaryl R' group of applicants' claims). Note that polysulfide polymers of the patent may contain ether repeating units at column 16, lines 23-43.

Claims 1-14 have also been rejected under 35 U.S.C. §102(e) as being anticipated by Maruyama et al. (USP 6,344,510). In support of this rejection the Examiner asserts that "Maruyama et al. disclose a vulcanizable rubber containing composition containing a polysulfide such as Applicants' cycloalkyl terminated polysulfide (note the Abstract and the structure at column 8, lines 33-40)."

The Applicants respectfully disagree. Yatsuyanagi et al. is directed toward a rubber composition comprising a vulcanizable rubber, a reinforcing filler and a sulfur compound



where x is 3 to 5. Maruyama et al. is directed toward polysulfide polymer vulcanizing agents and rubber composites containing the same. The polysulfide has an average number of sulfur bonds in the respecting units of more than 2 and not more than 6; the formula is



where Y is an alkylene group which may include a hetero atom, R is a residue obtained by reacting a thiol group with an unsaturated alicyclic compound or unsaturated hydrocarbon, n is an integer of 1 to 100 and x is more than 2 but not more than 6. The Applicants' invention is based on the use of difunctional compounds, such as dimercaptans, which contain only 2 sulfurs per repeat unit, not 3 to 5 or 3 to 6.

Both Yatsuyanagi et al. and Maruyama et al. are commonly owned by Yokohama Rubber Co., Ltd., and both teach that their respective polysulfide agents are end-capped, by initially reacting a polysulfide with another compound. Yatsuyanagi et al. '361 initially prepares the polysulfide by end-capping it with various groups: allyl end, 4 sulfurs (specification col. 19); allyl end, 6 sulfurs (specification col. 20); benzyl end, 4 sulfurs (specification col. 21); hydroxy end, 4 sulfurs (specification col. 21), alkyl end, 4 sulfurs (specification, col. 21) and so forth throughout the specification. The Applicants' invention is different in that the mercaptan is allowed to be incorporated into the rubber, without previous end-capping. Accordingly, the Applicants take issue with the Examiner's assertion that Yatsuyanagi's benzyl terminated Thiokol LP-31 is embraced by the alkaryl R' group of their claims.

Maruyama et al. reacts the polysulfide and an unsaturated alicyclic compound or unsaturated hydrocarbon compound (see column 2, lines 61-67 and column 3, formulae III and IV).

"A first polysulfide polymer having a capped end thiol group of the present invention can be produced by carrying out an addition reaction between a polysulfide polymer having a thiol group at the end thereof shown in the above formula (II) and an unsaturated alicyclic compound with or without the use of a solvent." (Column 4, lines 27-32).

"A second polysulfide polymer having a capped end thiol group of the present invention can be produced by carrying out an addition reaction between a polysulfide polymer having a thiol group at the end as shown in the above formula (II) and an unsaturated hydrocarbon compound having the above formula (III) or (IV) in a solvent or without the use of a solvent and in the presence of a catalyst." (Column 5, lines 24-30).

Maruyama et al. note that polysulfide polymers have been used as rubber vulcanization agents.

As a rubber vulcanization agent for improving the heat stability of the vulcanized rubber without forming nitroso amines during the vulcanization, a polysulfide polymer containing a large amount of sulfur in the molecular chain has been reported (for example, see (1) Gomu Kogyo Binran.

* * *

However, a conventional polysulfide polymer is volatile and has a strong odor, and therefore, a vulcanized rubber using this as a vulcanization agent gives a strong odor and is not suitable for practical use (U.S. Pat. No. 2,235,621). (Column 1, lines 34-53).

However, when the above liquid polysulfide polymer per se is used as a vulcanization agent, since the end group structure of the polymer is a thiol group, so-called "scorching" where the vulcanization proceeds early at the time of processing easily occurs. Further, since the average number of sulfur bonds in the repeating units is not more than 2, there have been the problems such that a long vulcanization time is required, for example. Thus, to prevent scorching during processing or shorten the vulcanization time, the technique has been adopted of capping the end thiol group in

the polysulfide polymer, then increasing the number of sulfur bonds in the repeating units (Column 1, line 58, column 2, line 2).

Thus, it can be seen that Maruyama et al. as well as Yatsuyanagi et al. require more than 2 sulfurs and end-capping before addition to the rubber. Accordingly, the Applicants take issue with the Examiner's assertion that the Applicants' cycloalkyl terminated polysulfide is disclosed by Maruyama. The Applicants' difunctional agents can include mercaptans e.g., dependent claims 2, 3 etc., or more broadly the difunctional crosslinking agents recited in independent claims 1, 6, 10, 15 and 20. However, the former difunctional crosslinking agents are not cycloalkyl terminated polysulfides taught by Maruyama, as the Examiner has alleged. Two differences are to be noted. First, where $m=0$, there are no Y groups present, hence, no "termination". Although the R group can be a cycloalkyl, the difunctional members, such as sulfur, are incorporated into the cyclic ring, the cycloalkyl group does not provide an end-cap. Second, where Y is present, it can be either H, or SR' or SiR'_3. While the latter two groups provide end-caps, the results are not cycloalkyl terminated polysulfides, taught by Maruyama. The Applicants add the mercaptan (or other difunctional agent) "as is", rather than first reacting it with a group to end-cap it, as taught by Maruyama. The reaction is then allowed to proceed competitively. The accelerator is added in small amounts to cleave the disulfide, allowing it to crosslink two polymer chains.

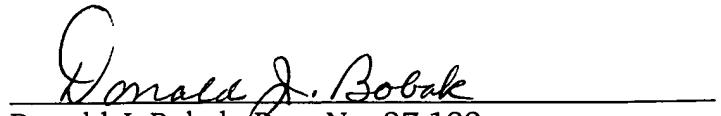
Lastly, the Examiner has rejected claims 15-20 under 35 U.S.C. §103 (a) as being obvious over either Yatsuyanagi et al. or Maruyama et al., of record. In support of this rejection the Examiner asserts that while neither reference discloses any examples in which their rubber compounds are incorporated into pneumatic tires, that it is well known to do so. In response, the Applicants contend that novelty of these claims is predicated on the patentability of the rubber articles recited in claims 10-14, which in turn, employ the novel elastomeric compositions of claims 1-5.

In conclusion, the Applicants respectfully request reconsideration and withdrawal of the rejections under 35 U.S.C. §§ 102 (e), 103 (a) and 112, a formal Notice of Allowance of

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claims 1-20 being earnestly solicited. Should the Examiner wish to discuss any of the foregoing in more detail, the undersigned attorney would welcome a telephone call. No additional fees are due with this response.

Respectfully submitted,



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